

THE FOSSIL COLLECTOR

BULLETIN N°17 OCTOBER 1985



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THE FOSSIL COLLECTORS ASSOCIATION OF AUSTRALASIA

EDITORIAL

At the end of our last Editorial we were bemoaning the fact that we couldn't find an invertebrate project to support, our previous donations having been directed to vertebrate "digs" and the casting of the replicas of the Chinese dinosaurs.

At last we have been able to balance the ledger, as it were, and make a donation towards the purchase of a rare invertebrate fossil (see "Fourth fossil king crab" found page 4).

Association members in Victoria, especially those who, in a voluntary capacity, have been able to assist the Invertebrate Palaeontology section of the Museum of Victoria, will be sad to learn that our Curator of the section, Dr. Peter Jell, is leaving to take up the position of Deputy Director at the new Queensland Museum in Brisbane. Peter has been a great help to amateur groups and has on many occasions supplied the Editor of this Bulletin with background material for articles. However, on the bright side what will be Victoria's loss will be Queensland's gain and, since we are a national association, we can be sure our northern members will keep him on his toes.

In the last Bulletin we commented on Paleobiology Seminars being held in Brisbane on a semi-regular basis. Up to now we have not received any date for the third seminar, but according to our Queensland representative Ian Sobbe, the second seminar held at the beginning of August was successful and extremely well attended by F.C.A.A., members. Ian's only complaint was that it wasn't long enough.

Some of you may already be aware that an informal association to defend the integrity of science has recently been formed. Known as "AUSTRALIAN APE" (Association for the Protection of Evolution) its main aim is to publicly refute the misleading and unscientific claims made by self styled "creation scientists" and to promote the public awareness and understanding of genuine science. Anyone wishing to obtain details of this Association and the reasons behind its formation should write to Tony Thulborn, Convenor of Australian APE, C/o., Dept., of Zoology, University of Queensland, St. Lucia, Queensland, 4067.

In January this year we (foolishly) boasted at having all the

articles and news items written before the month of publication of the Bulletin.

Unfortunately, as you can see by the date of this issue we are a month late and in this case found ourselves with no articles in reserve and few news items with which to start compiling a magazine.

Even if individual members are not in a position to write material or send news items for possible publication it would be of considerable assistance to have suggestions as to the type of articles they would like to see and notes on likely reference material and sources of illustrations etc. Some of you may even know of someone outside the Association who could be persuaded to assist.

Remember the next issue is due out in JANUARY '86 - only three months away.

FRANK HOLMES

GEMBOREE 1986 LOXTON - FOSSIL COMPETITIONS

Gemboree 1986 will be held at the Loxton Recreation Centre, Loxton, South Australia from 28th to 31st March, 1986.

The fossil sections of the 1986 National Gem & Mineral Competitions to be held in conjunction with the Gemboree are as follows :-

FOSSILS: NON DISPLAY

Refer to Part D of the "Competitor & Judging Manual - Lapidary and Allied Competitions" (Issue No.4 April, 1983) for definitions and general details.

(a) Fossils : Non Display : Single Specimen :-

- J 26A-1 Invertebrates : Australian Locality Only
- J 26A-2 Vertebrates : Any Locality
- J 26A-3 Plants : Any Locality

(b) Fossils : Non-Display : Group of Two Specimens :-

- N 26A-4 Invertebrates : Australian Localities Only
- N 26A-5 Vertebrates : Any Localities
- N 26A-6 Plants : Any Localities

Cont...

GEMBOREE 1986 LOXTON - FOSSIL COMPETITIONS (Cont'd)(c) Fossils : Non Display : Group of Three Specimens :-

- 0 26A-7 Invertebrates : South Australian Localities Only
- 0 26A-8 Invertebrates : Australian Localities Only
- 0 26A-9 Vertebrates : Australian Localities Only
- 0 26A-10 General : Any Localities
- 0 26A-11 Plants : Any Localities

General and Special Conditions of Entry can be obtained by writing to the Gemboree Competition Co-ordinator, C/o., 59, Harvey Road, Elizabeth Grove, South Australia, 5112, requesting a copy of the "Competition Schedule and Conditions of Entry."

Nomination Forms and Entry Fees etc., are to be mailed to the Gemboree 1986 Fossil & Mineral Competitions, P.O. Box 696, Salisbury, South Australia 5108, not later than 1st February 1986. Actual entries are to be delivered to the Loxton Recreational Centre between 12.00 noon and 10 p.m. on Thursday 27th March, 1986, or, between 8 a.m. and 10.30 a.m., on Friday 28th March, 1986 and set up ready for judging by not later than 11.00 a.m., Friday 28th March, 1986.

FOURTH FOSSIL KING CRAB FOUND

In Bulletin No.15 (January 1985), we published an article by Dr. John Pickett in which he gave details of the three only fossil king crabs that have been found in Australia at that time.

Recently a further specimen has been discovered and offered to the Australian Museum, this time for a price.

The specimen is preserved as counterparts with quite strong relief in a Late Devonian sandstone from the Bumberry Range east of Parkes in New South Wales. It is believed to be from the Connolly's Pipe Formation, which so far has yielded only Leptophloeum in the way of identifiable fossils.

Being only the fourth fossil king crab (limuloid) ever found in Australia its importance cannot be over stated.

To help raise funds for the purchase of this rare specimen

the Australian Museum Society has arranged for Dr. Pickett to give a lecture on Thursday, 24th October, 1985 at 7.30 p.m., in the Hallstrom Theatre, William Street, Sydney. The title of the talk is "Not so Much a Lecture - More of a Rescue Operation.....Save the Fossil King Crab."

To get the "rescue operation" off to a good start the F.C.A.A., on behalf of its members, has made a donation of \$150.

Anyone wishing to make a personal donation should send a cheque or money order made payable to The Australian Museum Society, 6-8, College Street, Sydney, 2000 and clearly identified for the purchase of the king crab or contact the Secretary, Wendy Wilkins.

FINANCES

Statement of finances as at 30th September, 1985.

Carried forward from previous year.	\$ 926.67
Add income 1st March to 30th Sept.	691.70
	<u>\$1618.37</u>
Less expenditure 1st March to 30th September.	606.72
Balance in hand	<u>\$1011.65</u>

IN THE NEWS

W.A. "tiger" UNEARTHED A SECOND TIME

Recently, when the discovery in Tasmania of the bones of several thylacines, believed to be more than 5,000 years old, was making news, Dr. Ken McNamara, Curator of Palaeontology at the Western Australian Museum, Perth, while checking a box of "old bones" found the fossilized remains of a 4,500 year old thylacine.

According to Dr. McNamara, the Museum has one of the world's best collections of mainland thylacines - believed to be slightly smaller than their Tasmanian counterpart.

Cont...

IN THE NEWS (Cont'd)

W.A. "tiger" UNEARTHED A SECOND TIME (Cont'd)

When he had finished putting the bones together he had a nearly complete skeleton, except for a missing shoulder blade and a few tail bones.

It was the first time that the skeleton had been assembled since its discovery nearly 20 years ago in a remote cave on the Nullarbor.

It was found on the cave floor with the incomplete skeletons of three other thylacines and one of the Museum's most famous acquisitions, a perfectly mummified animal that is the envy of scientific institutions throughout the world.

The thylacines were the dominant predator in Australia till the dingo started to displace them less than 10,000 years ago.

Bones have been found in W.A., from the Kimberleys to the south coast.

Important fossil remains were found in caves near Augusta and in other caves near Wanneroo and Yanchep.

The bones at Wanneroo were found with those of the Tasmanian devil, now also extinct in this State.

About 15 years ago part of a thylacine leg was found at a site in the Kimberleys with other animal bones.

The other bones were carbon-dated at about 80 years and, though the thylacine was not, it raised the possibility that some thylacines could have been alive in W.A. at the time of European settlement.

Dr. McNamara said he hoped that the reassembled skeleton and the mummified animal would go on public display.

The West Australian, Monday June 17th, 1985.

BONES MAY PROVIDE MISSING LINK TO MAN!

Fragments of a primate jawbone found in Burma, and estimated to be 40 to 44 million years old, provide a crucial link in the evolutionary path that led to human beings, according to a new report.

The bones represent the most ancient species yet discovered from the higher primate group known as anthropoids - the family that gave rise to monkeys, apes and humans.

These Burmese fossils which predate other proven anthropoidal remains by at least 5 million years, represent a key early stage in the emergence of higher primates from the pre-existing lower primates known as prosimians.

Russell Ciochon, who with Donald Savage of the University of California and two Burmese scientists, Mr. Thaw Tint and Mr. Ba Maw wrote a report in Science magazine, they believe the animal spans the gap between lower and higher primates. The Burmese findings also suggested that the initial emergence of higher primates might have occurred in southern Asia rather than, as is widely believed in Africa.

In this view, which some scientists have disputed, anthropoids could have crossed a narrow, swamplike sea to Africa, where their descendants later evolved into monkeys, then apes and then humans.

According to Mr. Ciochon the ancient Asian primate, genus name Amphipithecus, is not a monkey, not an ape, and not a human, but a common ancestor of them all.

Other scientists have warned that it can not be determined on the basis of jawbone pieces alone, whether the Burmese species was a direct human ancestor or a specimen from a side branch of anthropoids that reached an evolutionary dead end.

Based on the size of the jaw and teeth, Mr. Ciochon conjectured that the animal was 0.62m to 0.93m tall and weighed 6.45kg to 8.6kg. It almost certainly lived in trees and ate fruits.

Although the jawbone shares anatomical features of both monkeys and modern prosimians the animal was unlike anything alive today.

Cont...

IN THE NEWS (Cont'd)BONES MAY PROVIDE MISSING LINK TO MAN! (Cont'd)

Generally it is believed the assertion that the Burmese fossil is an anthropoid is quite plausible and consistent with other clues. The discovery represents a major transition, a fundamental change in the evolutionary record.

The report confirms a theory that had been debated for decades. In the 1920's, a jaw fragment was discovered in the Pondaung hills of central Burma that was later named Amphipithecus and said to be an anthropoid. Fossils from another primate species discovered in Burma were also described as anthropoidal.

But those fossils were too fragmentary to convince sceptics, and the proper classification of Amphipithecus and the other species had been in dispute for decades.

In 1975, Burmese researchers, working in co-operation with Mr. Ciochon and Mr. Savage, returned to the 1920's site and discovered new primate fossils. One was the rear portion of a lower jaw of Amphipithecus.

This, together with the frontal jaw fragment found half a century before, provided a nearly complete picture of the species' lower jaw, including several teeth.

The earliest species that could be placed on the direct evolutionary line leading to humans had until now been thought to be an anthropoid known as Aegyptopithecus, remains of which were discovered in Egypt.

Report from The New York Times in
The Weekend Australian
August 17-18th, 1985.

ANTARCTIC FOSSIL "a new species"

A previously unknown dolphin-like mammal has been identified from a fossil found on a plain in the Australian Antarctic Territory.

In itself the fossil skull could add a new chapter to the evolutionary history of whales and dolphins. It may be from a family now extinct.

But the discovery also indicates that Marine Plain, eight kilometres from Davis Station, is rich ground for fossils of a time when humans were just beginning to walk upright, about 4 m. years ago.

The Australian Government's Antarctic Division's head of research, Dr. Pat. Quilty, came upon the fossil on a walk after breakfast in February.

The identification, disclosed yesterday, was made by a world authority on fossil whales and dolphins, Dr. Ewan Fordyce of Otago University in Dunedin, N.Z.

Dr. Fordyce considers that the Quilty specimen represents a new species and genus related to the dolphin.

Dr. Quilty was leading colleagues along a line of fossil shells at Marine Plain when he saw what at first looked like a shattered rock.

He photographed and numbered the shattered pieces, collected them, and on his return to Australia sent them to Dr. Fordyce who supervised the slow reconstruction.

Dr. Fordyce's staff have put together a 650 millimetre skull and upper jaw. It had no teeth in the jaw, but did have a pronounced beak.

The creature was probably about four metres long, has a small dorsal fin and small foreflippers with horizontal tail.

The Adelaide Advertiser, Wednesday,
August 28th, 1985.

DINNER, BED & ECHINOIDS OR "LOV-ENII-DAE"

Echinoid collectors will be familiar with the vast Tertiary deposits of the Murray Basin and in particular the rich outcrops of fossils in the cliffs of the Murray River from Tailem Bend to Loxton in South Australia.

But while most spend their time scouring the numerous quarries, cliffs and gullies to be found along this stretch of Australia's greatest river, a few F.C.A.A. members, known

Cont...

DINNER, BED & ECHINOIDS OR "LOW-ENII-DAE" (Cont'd)

for their prowess in sniffing out echinoids, have discovered a very leisurely way of obtaining specimens almost without, as it were, stepping out of bed.

Although it could be a little expensive in the long term, we have it on good authority that a stay in a "stratigraphic" unit at the Mannum Motel can be very rewarding, since it is partly built into the side of the hill and the recently established garden between the units displays a fossil fauna among the flora - Lovenia, Monostychia, Eupatagus and even Corystus.

Anyone wishing to holiday with the echinoids, even if it may be diplomatic to dig them from someone else's bed, will certainly be well looked after. We even hear they're building a Spa - could it be for echinoid cleaning?

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Pauline & Ray
Trent

Telephone:
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VICTORIA'S FOSSIL BEACH

An inconspicuous signpost huddled back among the tea-tree on the west side of the Esplanade, the coast road which runs from Mornington to Dromana via Mount Martha, points the way to probably the most well known fossil locality in Victoria.

Fossil Beach (Mornington), as it is known, is situated on the shore of Balcombe Bay some 48 kms south of the City of Melbourne on the east side of Port Phillip.

The beach itself, which is not particularly inviting to bathers, is small and obscured from the main road by the coasted vegetation. A short track leads down through the tea-tree to a small car park overlooking a stone retaining wall built many years ago to protect the beach access from erosion.

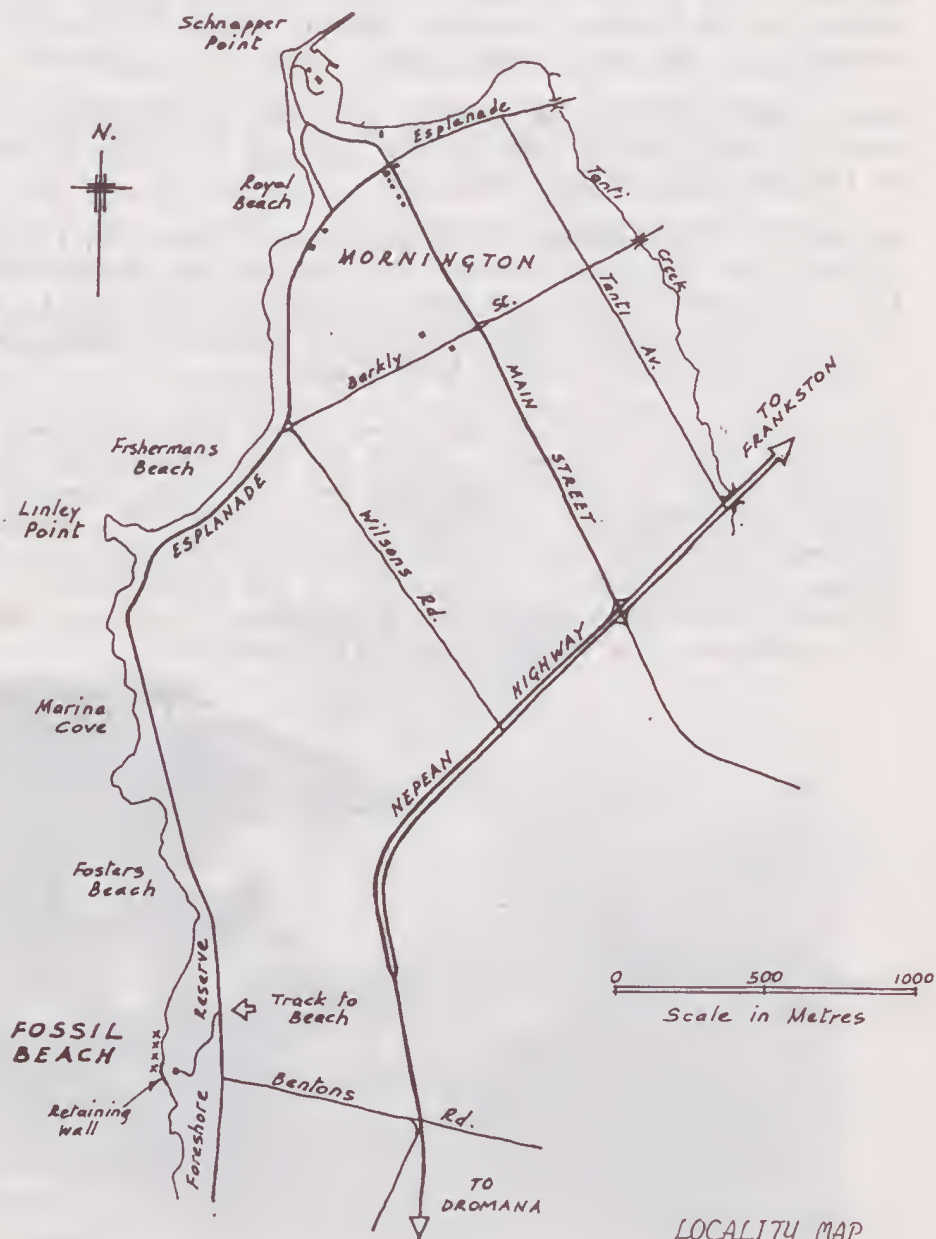
The bay of which Fossil Beach forms a part bears the name of Alexander Beatson Balcombe, son of the William Balcombe who was superintendent of public sales for the East India Company on the island of St. Helena. When Napoleon arrived at St. Helena, Balcombe became purveyor to his household, and later, in 1823, he was appointed Colonial Treasurer in New South Wales. Alexander Balcombe took up land around Mount Martha in 1842, and his homestead, "The Briars," is still standing.



Track leading to Fossil Beach.

Cont...

VICTORIA'S FOSSIL BEACH (CONT.)



In the early days of the Victorian colony, limestone of good quality in the easily accessible form of "septarian nodules" was found at Fossil Beach and a cement factory built there about 1861.

Although the enterprise failed and the site has been disused for more than 100 years the remains of some of the wells, water vats, grinding mills and stone kilns etc., are still to be seen and form one of Victoria's minor historic ruins. The area is also important historically in that Matthew Flinders landed a stone's-throw from the southern point of the beach in 1802, over 30 years before the colonization of Victoria.

The little arc of scattered rocks and stones that form the "beach" has a fossil record that is world famous. Arthur R.C. Selwyn, the founder of Victorian Geology, recognised the importance of the locality soon after his arrival from Great Britain in 1852, having been appointed by Governor Latrobe as a mineral surveyor. Frederick McCoy, Professor of Natural Science at Melbourne University who became Palaeontologist to the Geological Survey in 1856 also found Fossil Beach one of his most fruitful hunting grounds as can be seen in the Prodrum of the Palaeontology of Victoria.

Most of the early work in classifying, naming and describing species was carried out by Professor Ralph Tate of Adelaide, most of whose papers were published in the Transaction of the Royal Society of South Australia. The Rev. Tenison Woods and McCoy dealt with quite a few species during the 1870's followed by numerous others right up to the present day.

The Tertiary sedimentary sequences on the Mornington Peninsula may be regarded as having been deposited in three phases - an early Tertiary terrestrial and volcanic phase; a marine transgression during the Miocene; and a final regressive phase leading to a return to terrestrial sedimentation in the late Tertiary followed by intense leaching and ferruginization.

At Fossil Beach marine fossils are found in bluish-grey calcareous and richly fossiliferous clayey silts known as the Balcombe Clay (Gostin, 1966) which forms part of the Fyansford Formation.

This locality where the Balcombe Clay is 21 metres thick is the type section of the Balcombian Stage of the Miocene

Cont...

VICTORIA'S FOSSIL BEACH (CONT.)



Fossil Beach looking south

1. *Ternivoluta antiscalaris* (Mc Coy)
2. *Serratifusus craspedotus* (Tate)
3. *Turris septemlinata* (Harris)
4. *Harpella harpularia* (Tate)

Digging in the blue-grey calcareous silt



2.



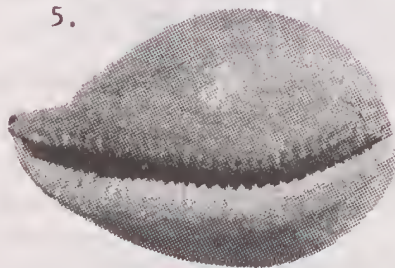
Typical gastropod

3.



Track leading up through the tea-tree

5.



5. *Austrocypraea contusa* (Mc Coy)

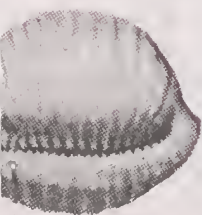
6. *Columbarium acanthostephes* (Tate)

7a. *Nototrivia avellanoides* (Mc Coy)

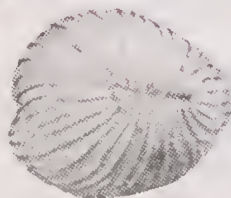
7b. " " "

Fossil Beach looking north from end of retaining wall

7a.



7b.



ds from Fossil Beach

Cont...

VICTORIA'S FOSSIL BEACH (Cont'd)

(Singleton 1941), however, some 6.4 kms N.E. at Manyung Rocks the unit is 52 m. thick and ranges from the Batesfordian to Bairnsdalian in age. Equivalent beds are also found further north at Frankston and as isolated remnants on the central horst of the Mornington Peninsula.

The outcrop at Fossil Beach represents portion of a sea-floor deposited under the rather deeper waters of the continental shelf during the marine transgression mentioned above.

The Balcombe Clay rests on terrestrial sediments which in turn overly the older (?Oligocene) volcanics of the area. The beds which lie beneath the sea level at Fossil Beach can be seen in a cliff face a little further south, due to a geological fault, an offshoot of Selwyn's Fault which caused them to be repeated at a higher level.

Overlying the Balcombe Clay which extends about 3 metres above sea level in the cliff at the back of the beach, is a thin (average 3 m thick) unit of very fine, well sorted quartz sand, the Marina Cove Sand in which marine fossils are rare. This was deposited in a very shallow marine environment during the late Miocene (Gostin 1966).

The regression was completed with deposition of the fluviatile Baxter Sandstone, probably in the Cheltenhamian (Late Miocene).

Collecting at Fossil Beach today is generally restricted to the zone between high and low tide. The construction of the foreshore retaining wall and continual digging in the base of the low cliff to the north of the car park have greatly reduced the exposure of fossiliferous blue-grey siltstone that would have been available to the early palaeontologists. In addition a report in the late 1940's stated that "within the living memory of residents, the sea has encroached about 50 yards (46 metres) upon what was once the tide-line."

The fauna of the Balcombe Clay is chiefly mollusca - in particular gastropoda, foraminifera and other microfossils, but includes bryozoa, sponges (spicules), brachiopods, echinoids and fish. A large bibliography relating to this fauna is listed in Singleton (1941).

As far back as 1903 Denant and Kitson had listed some 344 species apart from bryozoa and foraminifera. To date at a rough estimate more than 400 species of molluscs alone have been recorded from this site.

The area is one of the richest in numbers in Victoria, and in character and quality the specimens are not equalled elsewhere. The protoconchs (embryonic shell or apex) of the gastropods are remarkably well preserved; many still have a high polish such as the volute Notopeplum and species of marginellids, olives and naticids; iridescence persists in the interior of the Nut shells Ennucula and in the shell of the cephalopod Aturia; most of the presumed original brown colour appears to have been retained in such species as Architectonica acuta; fine spines and delicate sculptures remain intact; and fragile, almost paper-like structures such as the winged varices of the murex Pterynotus velificus and shelf of the limpet Zeacrypta may be found in almost perfect condition. Many bi-valves still have both valves conjoined and hinge teeth unimpaired. Only recently a specimen of Natica was dislodged from the clay complete with its operculum.

The largest fossil to be found at Fossil Beach is the giant cowrie Cypraea gigas McCoy.

The ecosystem at the time of deposition can be reconstructed by a close study of the fauna. There were pelagic forms like the cephalopod Aturia and the pteropod Vaginella eligmotoma; fish (represented by otoliths or ear bones); limpets which perhaps lived attached to flotsam; species which grew on the shells of other forms such as bryozoa; calcareous tube worms; barnacles and so on. There is an amazing array of bottom-living species and the food supply must have been abundant although there is no fossil record of the rich algal flora needed to support them. Evidence of carnivorous food habits among molluscs is seen in the holes present in many specimens which resemble those drilled by living carnivores such as naticids and muricids.

A comparison of the fossil shells with living species indicates a greater similarity with warmer-water Australian types than with local Victorian ones. Forms such as the larger foraminifera, certain echinoderms, the bivalve Cucullaea, and the highly spinose gastropods such as those of the Murex type, are indicative of warmer times. Crocodilians were present as far south as Victoria where, on land, the warmer climate kauri trees

Cont...

VICTORIA'S FOSSIL BEACH (CONT.)

(Agathis) and Araucaria were thriving and evidence from soils and other criteria show that temperatures were indeed higher during the Middle Miocene.

To uncover the wealth of fossil shells that are still to be found in the soft siltstone between high and low tide level it is best to use a spade, or even better a fork, to loosen sections of material which can then be progressively broken up into smaller pieces with an old knife, screwdriver or similar implements. Removal of specimens from the matrix must be done carefully preferably with the aid of water and a sharp pointed knife. Final cleaning will depend on the type and thickness of the shell and may require the use of a dental probe and a fine (water colour) paint brush. Unfortunately, only experience will teach you how to deal with the wide variety and standard of preservation of the fossils you will find.

A great deal of work remains to be done on the Fossil Beach molluscs, particularly with regard to the nomenclature of the genera, many of the fossils falling quite naturally into genera erected for recent species and vice versa.

ACKNOWLEDGEMENTS AND GENERAL REFERENCES

The above article has been compiled from the following sources:

"Balcombe's Bay...A Famous Site for Fossils" Wild Life, Feb., 1947.

"Fossil Beach - Mornington" Article based on a talk by T.A.Darragh, Deputy Director, Museum of Victoria. Bulletin of the Malacological Society of Australia, Victorian Branch, Aug/Sept.1985.

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pl. 2 - 20.
- 1889 The Gastropods of the Older Tertiary of
Australia - Part III, Ibid 13: 185 - 235.
-

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THE DIGGER ISLAND TRILOBITES

An article based on a recent paper by Dr. P.A. Jell,
Curator of Invertebrate Palaeontology,
Museum of Victoria.

Ordovician rocks and their metamorphic derivatives are the most widespread of all pre-Tertiary rocks in Victoria.

Estimated to range up to 3,000 m. in thickness, they are predominantly silty quartz sandstone and greywacke, argillaceous and sandy siltstone and silty claystone in varying proportions, although thin limestone bands are present at Waratah Bay.

Anyone who has a general knowledge of Victorian palaeontology will more than likely associate the Ordovician of the State with the rich sequences of graptolites that extend through the whole period.

Of the lesser known benthonic fossils, which include the crustacean phyllocarids, brachiopods, gastropods and nautiloids etc., probably the most important fauna are the trilobites from Digger Island, first identified by Singleton in a paper by Lindner (1963).

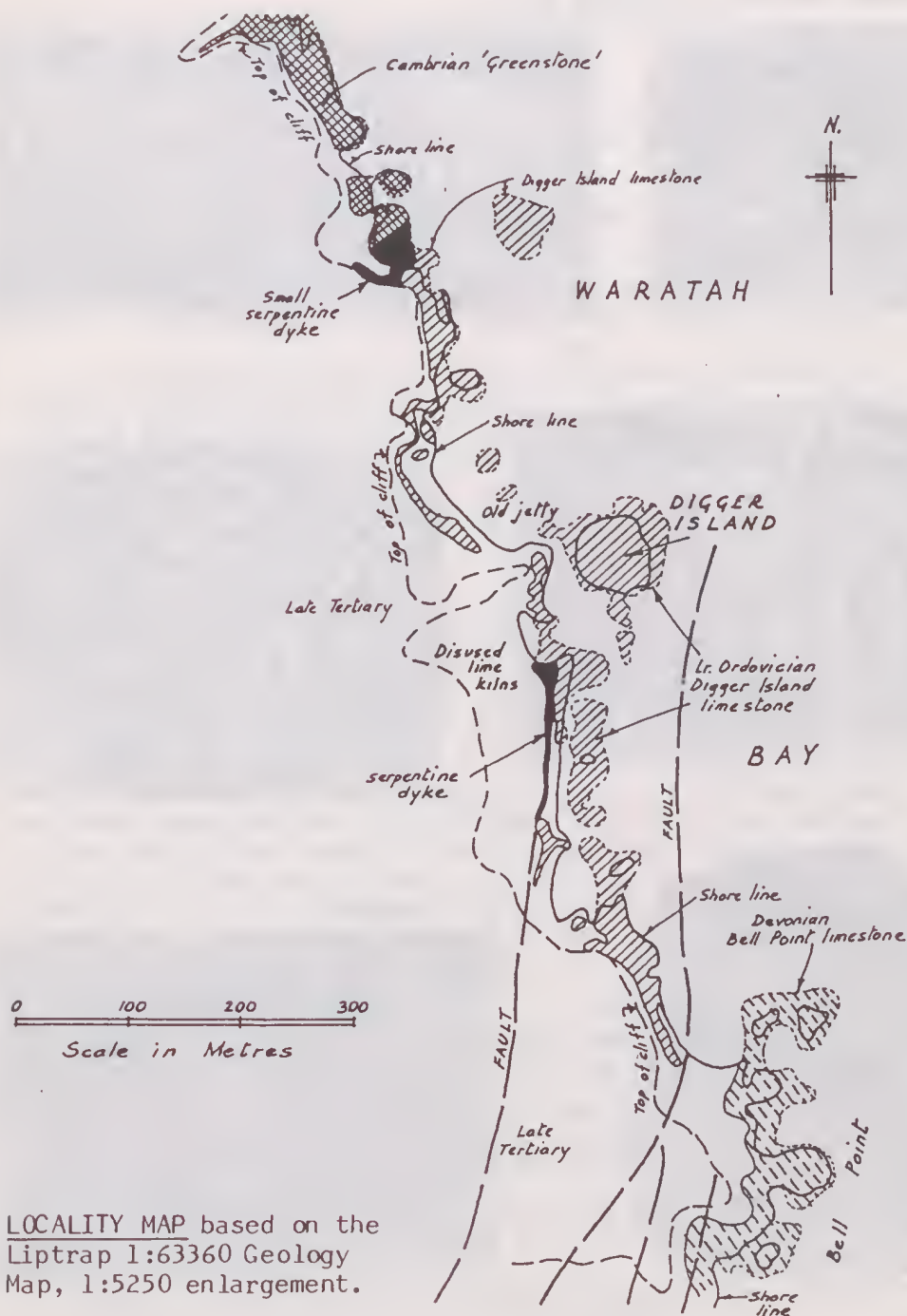
In a recent paper "Tremadoc trilobites from the Digger Island Formation, Waratah Bay, Victoria," P.A. Jell (1985), describes:

(1) Five new species from four new genera :

Natmus victus
N. tuberos
Brachyhipposiderus logimus
Landyia elizabethae
Victorispina holmesorum

(11) Six new species from previously erected genera :

Neoagnostus eckardti
Onychopyge parkerae
Pseudokainella diggerensis
Australoharpes singletoni
A. expansus
Protopliomerops lindneri



LOCALITY MAP based on the
Liptrap 1:63360 Geology
Map, 1:5250 enlargement.

Cont...

THE DIGGER ISLAND TRILOBITES (CONT.)



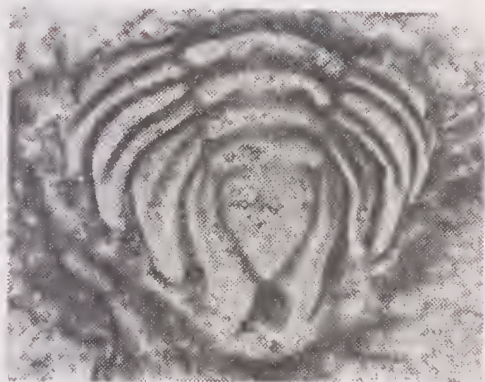
1a.



2a.



1b.



2b.



3.



4.

(111) Four new taxa left in open nomenclature :

Pilekia sp.

Tessalacauda? sp.

Parahystericurus sp. cf. *P. fraudator* Ross, 1951.

Hystericuridae (new genus)

(IV) Identifies three Argentinian species :

Micragnostus hoeki (Kobayashi 1939)

Shumardia erquensis Kobayashi 1937

Leostegium douglasi Harrington 1937

Jell considers that the Digger Island Formation trilobite fauna may best be correlated with the *Kainella meridionalis* zone of Argentina and assigned an early Tremadoc age probably contemporaneous with Lancefieldian 1 zone faunas of the Victorian graptolite sequence and possibly the *Oneotodus bicuspatus*-*Drepanodus simplex* zone faunas (Shergold 1975) of western Queensland.

Digger Island itself is a small stack approximately 75 m. in diameter, isolated from the mainland above half-tide and situated about 1.5 km south of Walkerville on the western shore of Waratah Bay, South Gippsland, Victoria.

The Digger Island Formation, of which the island is the type locality, is a sequence of fossiliferous yellow brown, grey and grey green shales and calcareous shales; poorly bedded, yellow decalcified mudstone and thin-bedded, fossiliferous, grey, grey-green and purple, fine grained, dense, siliceous limestones. The sediments are strongly sheared and esti-

Cont...

PLATE 1. (left)

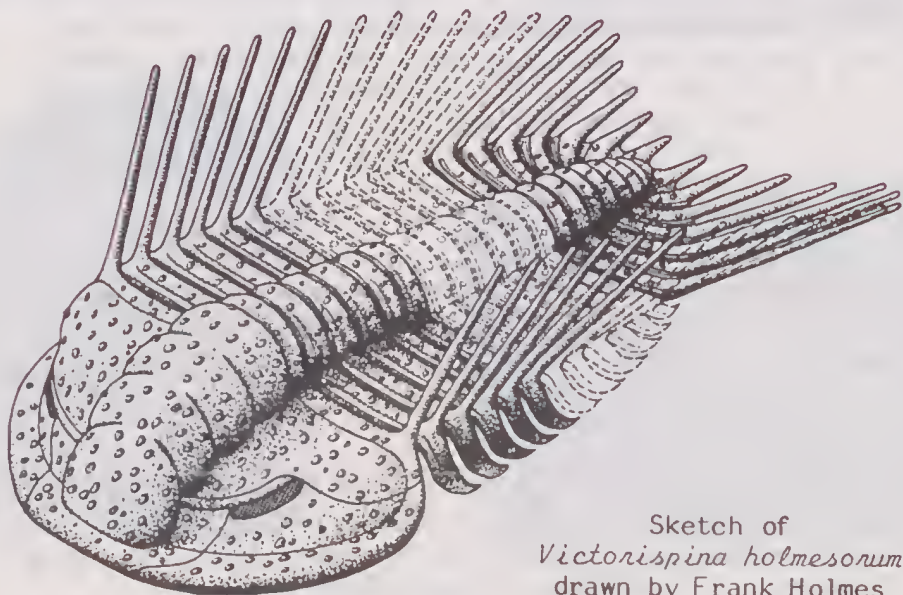
1. *Protopliomerops lindneri*. Internal mould of cephalon, dorsal view x9 (a). Latex cast from external of pygidium x5 (b).
2. *Landyia elizabethae*. Latex cast from incomplete external mould, dorsal view x 5 (a). Internal mould of pygidium, dorsal view x6 (b).
3. *Australoharpes singletoni*. Latex from external mould, dorsal view x3.
4. *Brachyhipposiderus logimus*. Latex from external mould of cranidium x 4 (sinistral stress deformed).

DIGGER ISLAND TRILOBITES (CONT.)

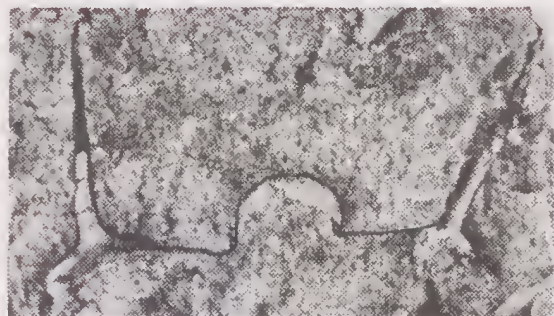
mated to be 36 to 40 metres thick. On its western boundary the formation is either intruded by gabbro or faulted against the diabase, a complex series of altered basic and intermediate lavas with interbedded pyroclastics, ash beds and sediments of pre-Upper Cambrian age, while on its eastern boundary it is faulted against the Lower Devonian Bell Point Limestone (Lindner 1953).

Singleton (1967), divided the formation informally into three parts; 1, a lower portion of massive recrystallised grey limestone without fossils except for a single indeterminate nautiloid; 2, brown decalcified mudstone with the trilobite fauna, some brachiopods, cystid plates, hyolithids, tentaculitids and rare nautiloids; and 3, upper shales and muddy limestones with orthid brachiopods.

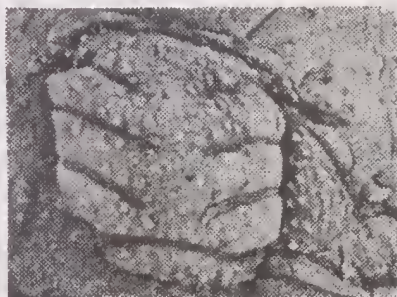
The trilobites are preserved as moulds in the very fine-grained decalcified mudstone but in many specimens a white mineral replacement has filled the void left by the exoskeleton. The fossils have undergone considerable distortion after burial as evidenced by compression in all directions on different specimens. This, along with observations during collection, indicates that the fossils were not strictly in bedding planes



Sketch of
Victorispina holmesorum
drawn by Frank Holmes



5a.



5c.

5b.



PLATE 2.

5. *Victorispina holmesorum*. Internal mould, of thoracic segment x 4.7 (a). Internal mould of damaged but articulated spec'n showing spines on cephalic border, thorax and pygidium x3 (b). Internal mould of incomplete cranidium x5 (c).

6. *Neoagnostus eckardti*. Exfoliated internal mould of damaged cranidium x 10.



6.

but were oriented at any angle to the horizontal very often in small pockets of individuals lying on top of each other.

Distortion also took the form of fracture of exoskeletons in almost every species, certainly the larger ones. This fracturing effected some individuals but not others of the same species while flexibility of the exoskeleton is shown by some unfractured individuals. Long delicate spines are retained and many articulated specimens are preserved indicating that the environ-

Cont...

DIGGER ISLAND TRILOBITES (CONT.)

ment must have been quite tranquil. It is therefore, presumed the fracturing was immediately post-depositional before lithification and the distortion by compression could have occurred anytime during diagenesis, the process involving physical and chemical changes in sediment after deposition.

The pygidia of two of the species *Landyia elizabethae* and *Protopliomerops lindneri*, clearly show the different morphologies of the internal mould and the external surface when the exoskeleton has some thickness and gives a warning against the use of internal moulds only, when describing decalcified specimens.

Unfortunately, as is so often the case, nearly all the material found to date consists of partial specimens. However, the number of different species described or identified clearly indicates the importance in Australia of this early Ordovician locality.

Once again it is pleasing to note that members of the Association were able to assist in collecting material.

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Photographs in this article where loaned by Dr. Peter Jell.

BOOK REVIEWS AND NEWS

"POSSUMS AND OPOSSUMS - STUDIES IN EVOLUTION" a new book to be released early 1986 represents a major turning point in our understanding of marsupial evolution.

For the first time since Ride's review of 1964, the whole subject of the evolutionary relationships of marsupials is thoroughly overhauled. In the more than 50 contributions by 38 American & Australian authors, five new families and many new genera and species of American and Australian marsupials are described for the first time. Some of these descriptions represent the results of up to 15 years of collection, preparation and study. Many represent the "births" of extraordinarily distinctive types of marsupials that lived 55,000,000 years ago in Brazil, 15,000,000 years ago in the Miocene forests of what is now the Simpson Desert, approximately 15,000,000 years ago in the dense rainforests of what are now the steamy limestone plateaus of north Queensland and 4,500,000 years ago in the cool wet rainforests of western Victoria. While some give us important clues about how the modern faunas evolved, others represent bizarre experiments that faded from the world millions of years before Man evolved.

Particular attention is given to the fossil record and evolutionary relationships of the families of Tertiary American marsupials and to the fossil record and soft tissue studies (e.g., serology and cytology) of the living Australian plant- and insect-eating marsupials. This emphasis is intended as a complement to "Carnivorous Marsupials" and "Possums and Gliders" (both of which are also available from Surrey Beatty & Sons). All of this work is then synthesized from several points of view to produce a fundamentally new view of the history of marsupials on the southern continents, North America and Europe.

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Cont...

BOOK REVIEWS AND NEWS (Cont.)

POSSUMS AND OPOSSUMS (Cont.)

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- Phalangerids (Cuscuses & Brushtail Possums)
- Miralinidae (Miocene Phalangeriforms)
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